**Writing and Balancing Chemical Equations**

Balancing chemical equations gets easier with practice. It is a basic guess-and-check method, often called “Balancing by Inspection”.

**Important notes:**

Hydrogen gas = H2

Nitrogen gas = N2

Oxygen gas = O2

Fluorine gas = F2

Chlorine gas = Cl2

Bromine liquid = Br2

Iodine solid = I2

Unless otherwise stated, water is in liquid form.

*For each of the following, write the skeleton equation and then balance the equation. Be sure to use all proper symbols like (s), (l), (g), and (aq). If the skeleton equation is already provided, then simply balance the equation.*

**Example:**

Hydrogen sulfide gas reacts with oxygen gas to yield sulfur dioxide gas and water.

Skeleton equation: H2S(g) + O2(g) → SO2(g) + H2O(l)

Balanced equation: 2H2S(g) + 3O2(g) → 2SO2(g) + 2H2O(l)

(You need not write the equation twice, just balance the skeleton equation.)

**PLEASE USE PENCIL! PLEASE USE PENCIL!**

1. Liquid carbon disulfide reacts with oxygen gas to yield carbon dioxide gas and sulfur dioxide gas.

2. Methane (CH4) gas reacts with oxygen gas to yield carbon dioxide gas and water.

3. Solid zinc sulfide reacts with oxygen gas to yield solid zinc oxide and sulfur dioxide gas.

4. Solid phosphorus (P4) reacts with oxygen gas to yield phosphorus(V) oxide gas.

5. Solid potassium chlorate decomposes when heated to yield solid potassium chloride and oxygen gas.

6. Solid sodium nitrate decomposes when heated to yield solid sodium nitrite and oxygen gas.

7. Solid copper(II) nitrate decomposes when heated to yield solid copper(II) oxide, nitrogen dioxide, and oxygen gas.

8. Solid phosphorus(III) oxide reacts with oxygen to yield phosphorus(V) oxide.

9. Ozone (O3) gas decomposes to yield oxygen gas.

10. Solid iron reacts with water to yield solid iron(III) oxide and hydrogen gas.

11. Na + Cl2 → NaCl

12. Sr + AuNO3 → Sr(NO3)2 + Au

13. SO3 + H2O → H2SO4

14. KOH + H3PO4 → K3PO4 + H2O

15. Li + H2O → LiOH + H2

16. Li2O + H2O → LiOH

17. Hg(MnO4)2 + Al2(Cr2O7)3 → Hg(Cr2O7) + Al(MnO4)3

18. Ba + P4 → Ba3P2

19. F2 + BiCl3 → Cl2 + BiF3

20. Pb(NO3)4 + K2S → KNO3 + PbS2

21. Water is decomposed with electricity to yield hydrogen gas and oxygen gas.

22. Solid magnesium reacts with oxygen gas to yield magnesium oxide.

23. Carbon dioxide gas reacts with water to yield solid glucose (C6H12O6) and oxygen gas.

24. Solid lead(IV) oxide decomposes with heat to yield solid lead(II) oxide and oxygen gas.

25. Solid sodium peroxide reacts with water to yield aqueous sodium hydroxide and oxygen gas.

26. Solid magnesium reacts with water to yield hydrogen gas and solid magnesium oxide.

27. Solid carbon reacts with oxygen gas to yield carbon dioxide gas.

28. Solid sucrose (C12H22O11) reacts with oxygen gas to yield carbon dioxide gas and water.

29. Propane (C3H8) gas reacts with oxygen gas to yield carbon dioxide gas and water.

30. Carbon gas reacts with water to yield hydrogen gas and carbon monoxide gas.

31. H3PO3 + (NH4)2CrO4 → (NH4)3PO3 + H2CrO4

32. Sn(OH)2 → SnO + H2O

33. H2SO4 → SO3 + H2O

34. P2O3 + H2O → H3PO3

35. Zn(BrO3)2 + Pb3(AsO4)4 → Zn3(AsO4)2 + Pb(BrO3)4

36. Rb + Al(IO4)3 → Rb(IO4) + Al

37. NaNO3 → NaNO2 + O2

38. Fe(NO3)3 → Fe2O3 + NO2 + O2

39. Cd + HF → CdF2 + H2

40. Sn + Cl2 → SnCl2

41. Solid potassium fluoride reacts with aqueous sulfuric acid to yield aqueous potassium hydrogen sulfate (KHSO4) and hydrogen fluoride gas.

42. Solid lithium nitride reacts with water to yield aqueous lithium hydroxide and ammonia (NH3) gas.

43. Solid calcium hydride reacts with water to yield aqueous calcium hydroxide and hydrogen gas.

44. Solid copper(II) oxide reacts with hydrogen gas to yield solid copper metal and water.

45. Solid manganese(IV) oxide reacts with hydrogen gas to yield solid manganese(II) oxide and water.

46. Solid zinc metal reacts with aqueous hydrochloric acid to yield aqueous zinc chloride and hydrogen gas.

47. Solid aluminum metal reacts with aqueous sulfuric acid to yield hydrogen gas and aqueous aluminum sulfate.

48. Solid potassium reacts with water to yield aqueous potassium hydroxide and hydrogen gas.

49. Solid iron metal reacts with aqueous hydrochloric acid to yield aqueous iron(II) chloride and hydrogen gas.

50. Aqueous sodium chloride and water are decomposed with electricity to produce chlorine gas, hydrogen gas, and aqueous sodium hydroxide.

51. (NH4)2(C2O4) + Hg3(PO3)2 → Hg(C2O4) + (NH4)3PO3

52. K2CO3 + MnCl4 → KCl + Mn(CO3)2

53. Co2S3 + O2 → Co2O3 + S

54. (NH4)2SO4 + Fe(NO3)3 → NH4NO3 + Fe2(SO4)3

55. BaCO3 + HClO3 → Ba(ClO3)2 + H2CO3

56. K + H2O → H2 + KOH

57. Al + HCl → H2 + AlCl3

58. F2 + AsCl3 → Cl2 + AsF3

59. Al + Pb(NO3)2 → Pb + Al(NO3)3

60. Bi2S5 + SbBr3 → BiBr5 + Sb2S3

61. Methane (CH4) gas reacts with water to yield carbon monoxide gas and hydrogen gas.

62. Carbon monoxide gas reacts with water to yield carbon dioxide gas and hydrogen gas.

63. Butane (C4H10) gas reacts with itself to yield liquid octane (C8H18) and hydrogen gas.

64. Solid aluminum reacts with aqueous sulfuric acid to yield aqueous aluminum sulfate and hydrogen gas.

65. Solid zinc reacts with sulfuric acid to yield aqueous zinc sulfate and hydrogen gas.

66. Solid calcium reacts with water to yield aqueous calcium hydroxide and hydrogen gas.

67. Solid iron reacts with water vapor to yield solid iron(II, III) oxide (Fe3O4) and hydrogen gas.

68. Solid magnesium reacts with hot water to yield magnesium oxide and hydrogen gas.

69. Solid aluminum reacts with sodium hydroxide and water to yield aqueous sodium aluminate (NaAl(OH)4) and hydrogen gas.

70. Solid silicon reacts with aqueous sodium hydroxide and water to yield aqueous sodium silicate and hydrogen gas.

71. Fe + Ag2CrO4 → Fe2(CrO4)3 + Ag

72. Cs + H2O → H2 + CsOH

73. Ni2(SO4)3 + Na2CO3 → Ni2(CO3)3 + Na2SO4

74. Ca(NO3)2 + (NH4)3PO3 → Ca3(PO3)2 + NH4NO3

75. LiI + H3PO4 → Li3PO4 + HI

76. Cl2 + SbBr3 → Br2 + SbCl3

77. Br2 + HI → I2 + HBr

78. H2SO4 + Zn → ZnSO4 + H2

79. Ba(NO3)2 + NaOH → Ba(OH)2 + NaNO3

80. Zn + CuSO4 → ZnSO4 + Cu

81. Solid manganese(IV) oxide reacts with hydrogen gas to yield solid manganese(II) oxide and water.

82. Solid iron(III) oxide reacts with hydrogen gas to yield solid iron and water.

83. Hydrogen gas reacts with nitrogen gas to yield ammonia (NH3) gas.

84. Hydrogen gas reacts with carbon monoxide gas to yield methanol (CH3OH) gas.

85. Solid copper(I) sulfide reacts with oxygen gas to yield solid copper(I) oxide and sulfur dioxide gas.

86. Solid calcium oxide reacts with solid aluminum to yield solid aluminum oxide and solid calcium metal.

87. Solid uranium(IV) fluoride reacts with solid calcium to yield solid calcium fluoride and solid uranium.

88. Solid barium carbonate reacts with sulfur trioxide gas to produce solid barium sulfate and carbon dioxide gas.

89. Solid barium sulfate will decompose when heated to yield solid barium oxide, sulfur dioxide gas, and oxygen gas.

90. Solid copper reacts with oxygen gas to yield a green-colored solid, copper(II) oxide.

91. Li + O2 → Li2O

92. Hg2O → Hg + O2

93. Fe2O3 + Al → Al2O3 + Fe

94. P2O3 + H2O → H3PO3

95. Sb(NO3)3 → Sb2O3 + NO2 + O2

96. NH4NO3 + HCl → NH4Cl + HNO3

97. Na2O + H2O → NaOH

98. KBr + Cl2 → KCl + Br2

99. N2O5 + H2O → HNO3

100. K2O + H2O → KOH